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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/521,544	01/14/2005	Shiro Sakai	08228/071001	9344

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EXAMINER	
QUINTO, KEVIN V	

ART UNIT	PAPER NUMBER
2826	

NOTIFICATION DATE	DELIVERY MODE
11/20/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/521,544

Applicant(s)

SAKAI ET AL.

Examiner

Kevin Quinto

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 November 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-3 and 8-15 is/are allowed.
- 6) ☒ Claim(s) 4-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>2 November 2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed August 28, 2007 have been fully considered but they are not persuasive. As stated in the previous Office action, claims 4 and 5 were rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford et al., ("Design and Performance of Nitride-based UV LEDs," Proceedings of SPIE, vol. 3938, pages 13-23, 2000) in view of Nettelblatt et al. (USPN 5,543,638). Crawford discloses all of the claimed invention with the exception of the claimed thickness of the quantum well layer. In the response filed on August 28, 2007, the applicant argues that the invention of currently filed claim 4 leads to new and unexpected results (p. 4 of the response) over the cited references. It is the applicant's burden to show that the thickness would provide an unexpected result. However Nettelblatt clearly and unambiguously discloses that adjusting the thickness of the quantum well layer in order to attain a desired emission wavelength is well known in the art (column 4, lines 8-10). The applicant's claimed thickness range is not considered to be unexpected in light of the teachings of Nettelblatt. Claims 6 and 7 were rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford et al., ("Design and Performance of Nitride-based UV LEDs," Proceedings of SPIE, vol. 3938, pages 13-23, 2000) in view of Makimoto et al. (United States Patent Application Publication No. US 2002/0195619 A1). The applicant argues that the invention of currently filed claim 6 leads to new and unexpected results (p. 4 of the response) over the cited references. It is the applicant's burden to show that

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the compositional ratio would provide an unexpected result. Crawford discloses all of the claimed invention with the exception of the claimed compositional ratio. However Makimoto clearly and unambiguously discloses that adjusting the content of the aluminum and indium in an AlInGaN layer in order to attain a desired bandgap is well known in the art (p. 7, paragraph 112). In light of the teachings of Makimoto, the applicant's claimed compositional ratio is not considered to be unexpected. Therefore the rejections made in the previous Office action stand

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford et al., ("Design and Performance of Nitride-based UV LEDs," Proceedings of SPIE, vol. 3938, pages 13-23, 2000) in view of Nettelbladt et al. (USPN 5,543,638).

4. In reference to claim 4, Crawford et al., ("Design and Performance of Nitride-based UV LEDs," Proceedings of SPIE, vol. 3938, pages 13-23, 2000, hereinafter referred to as the "Crawford" reference) discloses a structure which meets the claim. Figure 1 of Crawford discloses a gallium nitride (GaN)-based compound semiconductor device comprising: a GaN-based light emitting member which comprises a multilayer quantum well including an InGaN well layer and an AlInGaN barrier layer. Crawford

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does not disclose that the thickness of the InGaN well layer is 1 nm or greater and 2 nm or smaller. However Nettelblatt et al. (USPN 5,543,638, hereinafter referred to as the "Nettelblatt" reference) discloses that adjusting the thickness of a quantum well layer in order to attain a desired emission wavelength is known in the art (column 4, lines 8-10). Thus Nettelblatt makes it clear that the thickness of the well layer is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the thickness of the well layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore claim 4 is not patentably distinguishable over the Crawford and Nettelblatt references.

5. With regard to claim 5, Crawford does not disclose that the thickness of the well layer is between 1.3 nm and 1.8 nm. However Nettelblatt (USPN 5,543,638) discloses that adjusting the thickness of a quantum well layer in order to attain a desired emission wavelength is known in the art (column 4, lines 8-10). Thus Nettelblatt makes it clear that the thickness of the well layer is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the thickness of the well layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore claim 5 is not patentably distinguishable over the Crawford and Nettelblatt references.

6. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford et al., ("Design and Performance of Nitride-based UV LEDs," Proceedings of

SPIE, vol. 3938, pages 13-23, 2000) in view of Makimoto et al. (United States Patent Application Publication No. US 2002/0195619 A1).

7. In reference to claim 6, Crawford ("Design and Performance of Nitride-based UV LEDs," Proceedings of SPIE, vol. 3938, pages 13-23, 2000) discloses a structure which meets the claim. Figure 1 of Crawford discloses a gallium nitride (GaN)-based compound semiconductor device comprising: a GaN-based light emitting member which comprises a multilayer quantum well including an InGaN well layer and an AlInGaN barrier layer. Crawford does not disclose the exact compositional ratio of aluminum in the AlInGaN barrier layer or the exact compositional ratio of indium in the AlInGaN barrier layer. However Makimoto et al. (United States Patent Application Publication No. US 2002/0195619 A1, hereinafter referred to as the "Makimoto" reference) discloses that adjusting the content of aluminum and indium in an AlInGaN layer in order to attain a desired bandgap is known in the art (p. 7, paragraph 112). Thus Makimoto makes it clear that the content of aluminum and indium in an AlInGaN layer is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the content of aluminum and indium in an AlInGaN layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore claim 6 is not patentably distinguishable over the Crawford and Makimoto references.

8. In reference to claim 7, Crawford does not disclose the exact compositional ratio of aluminum in the AlInGaN barrier layer or the exact compositional ratio of indium in

the AlInGaN barrier layer. However Makimoto (United States Patent Application Publication No. US 2002/0195619 A1) discloses that adjusting the content of aluminum and indium in an AlInGaN layer in order to attain a desired bandgap is known in the art (p. 7, paragraph 112). Thus Makimoto makes it clear that the content of aluminum and indium in an AlInGaN layer is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the content of aluminum and indium in an AlInGaN layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore claim 7 is not patentably distinguishable over the Crawford and Makimoto references.

Allowable Subject Matter

9. Claims 1-3 and 8-15 are allowed.

10. The following is a statement of reasons for the indication of allowable subject matter: the examiner is unaware of any prior art which suggests or renders obvious a gallium nitride based compound semiconductor device with a buffer layer adjacent to a gallium nitride based light emitting member which is comprised of a multilayer quantum well structure with an indium gallium nitride well layer and aluminum indium gallium nitride barrier layer.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quinto whose telephone number is (571) 272-1920. The examiner can normally be reached on M-F 8AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on (571) 272-1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KVQ

/A. Seifer/
primary Examiner
AU 2826